WHAT IS A STAR?

28.

AMERICAN TRACT
SOCIETY.

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—25—

PUBLISHED BY THE

AMERICAN TRACT SOCIETY,

150 NASSAU-STREET, NEW YORK.

WHAT IS A STAR?

Snow was on the ground; but the air was clear, and the wind still. Fires were burning brightly, and the closed shutters and warm curtains invited to the enjoyment of a long winter evening, with all the pleasant occupations of a well-regulated family.

"Where have you been, my dear? You look so cold;" said Mrs. M., as she crossed the hall, and met Alexander returning from the garden.

"Oh mamma," replied the little boy, "I was looking at the globe, and ran out to see if I could

distinguish the Pole star in the sky. Will you be so kind as to tell me what I want to know."

"Well, we must see if my stock of wisdom is sufficient for the purpose," replied Mrs. M., smiling. "Now then, what are your questions?"

"Why, mamma, first of all the star globe is covered all over with pictures, and I do not see any thing of the kind in the sky."

"The globe representing the stars is called the celestial globe, my dear, but those pictures are only intended to help our observations of the different starry groups, or constellations, which the ancient astronomers fancied to compose these figures, and which they named accordingly."

"What very queer things they fancied those constellations were, mamma! Only look, what an odd mixture of men and animals, boxes and crowns, with here and there some hideous snakes twining. Who divided the stars in this manner?"

"Some of those names are of very early origin. The Egyptians are supposed to have had the honor of naming most of the constellations."

"But they all have Latin names, mamma; how is that?"

"When the Roman empire was most extensive, the Latin language was usually adopted for all works of literature. Hence, when the Romans conquered eastern nations, the learning of these

conquered nations, if they had any, was translated into the Latin language; and, among other things, the names of the constellations."

"There is a very bright star which shines in at our parlor-window every evening, mamma; I suppose that has a name of its own."

"That is the planet Jupiter, my dear, and is much nearer to us than any of the stars. When examined through the telescope, however, it is not nearly so brilliant as the star called Sirius."

"How is that, mamma, if it is so much nearer to us?"

"Because the planets are solid opaque bodies, shining only by the reflection of the sun's rays; but we have every reason to believe that stars shine by their own light."

"Which is Sirius, mamma?"

"That large star in the constellation Canis Major, or the Great Dog. It is supposed to be the nearest to us."

"I wonder how that looks through the telescope."

"Sir William Herschel states that once, when he was looking for some very distant stars, with his celebrated large telescope, he was suddenly surprised by a great light, which gradually became brighter and brighter like the dawn of the morning; he wondered what was coming, till at

length this brilliant star passed slowly before his glass with all the splendor of the rising sun, so that he could not bear its dazzling effect, but was obliged to take his eyes from it."

"Did he not turn the telescope away?"

"No; that was fixed by machinery on account of its size; so he was obliged to wait some time, till it had passed out of his way; or rather, till the earth moving round had carried him beyond it."

"How many stars do you think we can really see with our own eyes, mamma?"

"Without the aid of glasses, it is generally considered that only about a thousand are visible at any one time."

"I should fancy many more than that are twinkling now, and yet I remember when I have tried to count just those I could see before the window as I lay in bed, there were not nearly such a number as I had expected."

"Dr. Herschel, by his large telescope, has discovered a cluster of five thousand."

"Dear mamma, if all these stars are worlds like our own earth and the other planets, how much God must have to take care of!"

"The discoveries now made by the telescopes in these boundless regions, my dear, are well suited to exalt our notions of God's wondrous power."

"What are the stars really, mamma?"

"There is every reason to believe that they are all suns, giving as much, or even more, light and heat than our own brilliant orb."

"How very wonderful, mamma! Then perhaps each star has planets and moons moving round it as our sun has."

"Very possibly, my dear. Indeed, most modern astronomers are almost involuntarily led to suppose, that each of these bright distant specks must in reality be the centre of a group similar to our own solar system."

"Perhaps some of these grand new telescopes may show us some planets belonging to the starry suns, mamma."

"Sir John Herschel has lately discovered some very tiny companions to several stars, which he has requested his brother astronomers to watch with minute attention; but it will doubtless require a long period to determine whether they really are planets revolving round the orbs we call stars."

"Then I suppose our sun only looks like a very large bright star to the people who live in the stars, if there are any."

"Our sun, my dear boy, would scarcely be visible with the best telescope ever made, even from Sirius, the nearest fixed star."

"How far off is Sirius, mamma?"

"It is too distant to be computed exactly, but

astronomers feel sure it cannot be so near as nineteen billions of miles."

"That is more than I can count: I wonder how large that star really is."

"Learned men have calculated that it gives more light than fourteen suns, each as large and bright as our own."

"How grand and dazzling such a light must be! But, mamma, some of the stars look red and others blue. How is that?"

"The reason is not known, especially as the same stars have been observed sometimes to change their color. Sirius, for instance, was celebrated by the ancients as a red star, but it now shines with a brilliant bluish whiteness."

"Can you tell me, mamma, how often any of the stars change their color?"

"They do so at various periods, shining brightly—diminishing—disappearing entirely—and then gradually returning to the state of their original splendor, some within three days, others in sixty, a hundred, or two or three hundred days, even to one hundred and fifty or two hundred years."

"I should like to see some of these changing stars, mamma; can I without a telescope?"

"Several of these 'variable stars' may be plainly distinguished, especially at their brightest season. One was noticed between the constellations

Cepheus and Cassiopæa shining brilliantly only in the years 945, 1264, and 1572.

"Was that the same star?"

"There seems every reason for considering it so, as it appeared somewhere in the year 1572 that a celebrated Danish astronomer Tycho Brahe related that he was going home from his laboratory one evening in November when he was surprised to find a group of country people gazing at a remarkably bright star which he was quite certain was not there half an hour before as he had just been taking a most exact survey of the heavens."

'How long did it stay, mamma?'

"It continued to grow brighter and brighter for seven nights, when it was so much more splendid than even the planet Jupiter that it was distinctly visible at mid-day. But it began to decline the very next month, and by March 1574 it had indeed quite gone away."

'Sometimes, mamma, when I look very attentively at a large star it seems as if there were two close together. Do you think there are?'

"Most probably what you saw were two stars very near together. However, there are several double stars, but they cannot be distinguished separately without very good telescopes."

'Then, mamma, are these double stars both suns? What do they move round?'

"Several of them appear to revolve round each other very, very slowly, and others move about some common centre of attraction."

"Does the law of attraction reach to those distant stars?"

"It appears to pervade all space, my dear, and is found in operation wherever telescopes have hitherto made discoveries of stars."

"I could not find the Pole star, mamma, when I was in the garden; could you be so very kind as to come and show it to me? or are you afraid of catching cold?"

"You may go and look out of the hall door, to see if the sky is clear, for if it is cloudy, our walk will be useless, you know."

Alexander gladly reported a favorable night, and went joyfully for his mamma's warm cloak and bonnet, with some snow boots, and wrapping himself in his greatcoat and muff they sallied forth on their astronomical expedition, having first carefully noted on the globe that the Pole star was situated at the end of the Little Bear's tail.

"There, mamma, is it not splendid?" exclaimed the little boy, as a rising ground enabled them to gain an extensive view of the horizon. "The stars are so bright, it seems as if they must be nearer than you said; and when they twinkle one almost expects to hear some sweet sound."

His mamma quoted from Addison,

"What [illegible]
[illegible]
[illegible]
[illegible],
In reason's ear they all rejoice,
And utter forth a glorious voice;
For ever singing as they shine,
The hand that made us is divine."

"Those are beautiful lines, mamma."

"And in perfect accordance with the Scriptures," continued Mrs. M——, "for 'the heavens declare the glory of God, and the firmament sheweth his handy work.' 'There is no speech nor language where their voice is not heard.'"

"But, mamma, we often read instead of the stars moving."

"Very true, but we must excuse a poet's describing things as they appear to common observation, instead of confining himself, to strict philosophical accuracy."

Now dear mamma," said Alexander stopping suddenly and looking up, "is that the Pole star?"

"Yes," replied Mrs. M——, "and there is the magnificent Orion and the pretty Pleiades," she continued directing his attention to the several starry groups.

"Why mamma they have changed their places since I looked at them last after tea."

"Oh, you know the rotation of the earth makes most of the stars appear to rise and set as the sun does."

"But some of the stars have moved such a long way round, and others only a very little distance, while the Pole star seems just in the same place."

"The Pole star scarcely varies at all, my dear, revolving in a small circle round an invisible point very near."

"How very strange! and do the other stars move round any point?"

"They all move round the same, Alexander, which is therefore considered to be exactly opposite the real pole, or end of the imaginary axis upon which the earth revolves."

"Then does the north pole be exactly under the Pole star?"

"Very nearly; and if we could penetrate the northern ice sufficiently to travel onwards till the Polar star was precisely over our heads, we should see the stars all describing circles round, as instead of appearing to rise above, and set below the horizon, as so many do now."

"Then is the Pole star exactly in the centre?"

"Not exactly, my dear, but so nearly that it affords quite sufficient guidance for navigation and accurate measurement."

"There is another thing that puzzles me, mam-

ma. "While you were putting on your bonnet I was looking on the globe for Orion and the Pleiades, and now you show them to me in the real sky. They seem as if in the opposite place to that I saw on the globe, and yet the names were printed as plain as possible and the pictures too; so I do not think I mistook them. What can be the reason for this?"

"You must remember, my dear Alexander, that you look on the globe as if you could peep from heaven *down* upon the stars, while when we walk out upon our earth, we are in the midst of the vast creation, and look *upwards* from the other side as it were."

"Then, to see the stars exactly as they are in the sky, we ought to be inside the globe, I suppose."

"Just so. When I was a little girl my mamma went out for a long visit, and when she came home she gave me a very interesting account of a copper globe she had seen at Cambridge, large enough for several people to go into, and sit down on a platform. This was pierced all over exactly to represent the stars in their relative positions, and by turning round was made to imitate the progress of night. Moreover, you could see the whole at once, so that the stars appeared to be shining under your feet, just as they really shine on the other side of the earth.

"Oh how I should like to see that, mamma, and how easy it would be to find out the constellations in the sky by looking at that!

"Do the people on the other side of the world see the same stars that we do?"

"They see some of the same my dear but our Pole star and all the constellations which never set to us, are invisible to them just as the south Pole and a correspondent number of stars invariably shine there but are not seen by us."

"How can people tell that mamma? because the stars do not shine in the daytime."

"In the polar regions both north and south you know there are long periods in which the stars shine throughout the twenty four hours composing our day and night or one revolution of the earth's axis but perhaps you will be surprised to learn that even here and during summer time too stars may be easily seen by telescopes of very ordinary power while from the bottom of mines or deep wells they are readily discerned by the naked eye."

"Oh mamma what was that?" exclaimed Alexander as a magnificent meteor darted across the heavens.

"It is called a shooting-star my dear. There is another and another" said Mrs. M. as several displayed their brilliant but evanescent beams

"Where are they gone to, mamma? Are they worlds put out and destroyed?"

"No, my dear boy; it seems very evident that those bright lights have no higher existence than in our own atmosphere, and in fact are not composed of any solid substance at all."

"Are shooting-stars to be seen every night?"

"Generally some may be observed. Monsieur Quételet calculates as many as sixteen in an hour from his own observations."

"Mamma, what is that broad pale line of light which seems to stretch all across the sky?"

"Astronomers term that the milky-way, my dear. It is found to consist of innumerable myriads of stars, so closely set that Sir W. Herschel considered that no fewer than fifty thousand had passed before his steady glass within a single hour."

"What an immense number must belong to it altogether, then."

"A number, my dear Alexander, far beyond our imagination to conceive, especially when you remember that this milky-way extends all round the earth."

"I wish I could see that large star globe you said grandmamma went to see, for it puzzles me very much to think of sky and stars the other side of the world, and therefore under my feet."

"I do not wonder at that, my dear boy, when the

most learned men themselves feel overwhelmed and confounded with the vastness of the prospect unfolded to them, as they peep forth with their telescopes from our little world, and behold these countless multitudes of orbs, far more splendid and complicated than our own; and yet the same mighty Being who created them, and sustains them now, made us; and we have inspired authority for saying, 'yet the Lord thinketh upon us,' ever providing for our comfort."

"How wonderful, mamma, that God should give us the Bible, and even condescend to send his Son to save us from hell, if ours is such a tiny world compared to others."

"If this should be the only region which sin has tainted, Alexander, how deep must be God's abhorrence of it, that so small a corner of his dominions could only be rescued from entire ruin by such a price. Seek the Saviour yourself, my precious child, and then spread the glad tidings of his atoning love by every means in your power; for 'they that turn many to righteousness, shall shine as the stars for ever and ever.'"

"Night comes with every star,
Making the streams, that on their noonday track,
Give but the moss, the reed, the lily back,
Mirrors of worlds afar."

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